DEPARTMENT OF TRANSPORTATION

Coast Guard

33 CFR Part 157

[CGD 91–045]

RIN 2115–AE01

Structural Measures To Reduce Oil Spills From Existing Tank Vessels Without Double Hulls

AGENCY: Coast Guard, DOT.

ACTION: Supplemental notice of proposed rulemaking.

SUMMARY: The Coast Guard solicits comments on structural measures for certain existing tank vessels of 5,000 gross tons (GT) or more that do not have double hulls. This supplemental notice of proposed rulemaking (SNPRM) responds to comments received on the notice of proposed rulemaking, presents a summary of a regulatory assessment for various structural measures, notifies the public of the availability of this assessment, and solicits comments on the economic feasibility of the measures. This SNPRM represents the third step in the Coast Guard's three-step effort to establish structural and operational measures, that are economically and technologically feasible for reducing the threat of oil spills from tank vessels without double hulls, as required by the Oil Pollution Act of 1990 (OPA 90). It analyzes a number of measures and describes the results of extensive cost and benefit research on those measures deemed technologically feasible. No regulatory text is introduced in this SNPRM; however, comments received on this SNPRM will enable the Coast Guard to assess the economic feasibility for structural measures.

DATES: Comments on this notice must be received on or before March 27, 1996.

ADDRESSES: Comments may be mailed to the Executive Secretary, Marine Safety Council (G–LRA/3406) (CGD 91–045), U.S. Coast Guard Headquarters, 2100 Second Street SW., Washington, DC 20593–0001, or may be delivered to room 3406 at the same address between 8 a.m. and 3 p.m., Monday through Friday, except Federal holidays. The telephone number is (202) 267–1477.

The Executive Secretary maintains the public docket for this rulemaking. Comments will become part of this docket and will be available for inspection or copying in room 3406, U.S. Coast Guard Headquarters, between 8 a.m. and 3 p.m., Monday through Friday, except Federal holidays.

FOR FURTHER INFORMATION CONTACT: LCDR Suzanne Englebert, Project Manager, Standards Evaluation and Development Division, at (202) 267–6490. This number is equipped to record messages on a 24-hour basis.

SUPPLEMENTARY INFORMATION:

Request for Comments

The Coast Guard encourages interested persons to participate in this rulemaking by submitting written data, views, or arguments. Persons submitting comments should include their names and addresses, identify this rulemaking (CGD 91–045) and the specific section of this proposal to which each comment applies, and give the reason for each comment. Please submit two copies of all comments and attachments in an unbound format, no larger than 8½ by 11 inches, suitable for copying and electronic filing. Persons wanting acknowledgment of receipt of comments should enclose a stamped, self-addressed postcard or envelope.

The Coast Guard will consider all comments received during the comment period. It may change this proposal in view of the comments.

The Coast Guard plans to hold a public meeting concerning this SNPRM. A notice of public meeting will be published in the Federal Register to announce the date, time, and location of the meeting.

Regulatory History

Section 4115(b) of the Oil Pollution Act of 1990 (OPA 90) (which appears as a statutory note following 46 U.S.C. 3703a) directs the Coast Guard to develop structural or operational requirements for tank vessels of 5,000 gross tons or more without double hulls to serve as regulations until 2015, when all tank vessels operating in U.S. waters are required to have double hulls under section 4115(a) of OPA 90 (46 U.S.C. 3703a). Regulations issued under the authority of section 4115(b) must provide as substantial protection to the environment as is economically and technologically feasible.

On November 1, 1991, the Coast Guard published an advance notice of proposed rulemaking (ANPRM) (56 FR 56284) which discussed structural and operational measures intended to meet the requirements of section 4115(b) of OPA 90. The ANPRM included a request for data on the technical and economic feasibility of those measures for use on vessels covered by section 4115(b). Eighty-eight comments were received by the close of the extended comment period, which ended on January 30, 1992 (57 FR 1243).

After reviewing the comments, the Coast Guard published an NPRM entitled ''Structural and Operational Measures to Reduce Oil Spills from Existing Tank Vessels Without Double Hulls'' (existing Vessels) on October 22, 1993 (58 FR 54870). The Coast Guard issued two subsequent correction notices on November 19, 1993 (58 FR 61143), and December 14, 1993 (58 FR 65298), which made technical corrections to the NPRM. In response to several comments received on the NPRM, the Coast Guard published, on December 16, 1993, a notice of public meeting and extension of comment period (58 FR 65683).

The Coast Guard held a public meeting on January 20, 1994, to obtain information from the public on the proposed regulations. Topics addressed by speakers included applicability, differences between tank barges and tankships, exemptions, and economic and technical feasibility of the proposed regulations. Some of the basic assumptions of the proposed regulations related to certain structural measures were also discussed, particularly their reliance on Regulation 13G of Annex I of the International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978 (MARPOL 73/78). Information on the public meeting is available for public review at the address under **ADDRESSES.**

In light of the comments received at the public meeting and in response to the written comments received on the NPRM, the Coast Guard conducted an extensive review of its regulatory plan for this rulemaking. To expedite the implementation of section 4115(b) of OPA 90, the Coast Guard developed a three-pronged approach which encompassed three separate rulemaking projects. First, the Coast Guard issued a final rule on August 5, 1994, requiring the carriage of emergency lightering equipment and the inclusion of the vessel's International Maritime Organization (IMO) number in the advance notice of arrival report (59 FR 40186); second, it issued a supplemental notice of proposed rulemaking (SNPRM) on November 3, 1995, (60 FR 55904) regarding additional operational measures; and third, it is issuing this SNPRM to describe its analysis of the technological feasibility and cost effectiveness of imposing various structural requirements.

Comments received on most of the structural measures proposed in the regulatory text of the Existing Vessels NPRM (58 FR 54870) were negative. As a result, the Coast Guard is no longer proposing any of the structural measures it proposed in the NPRM. Instead, the Coast Guard is reexamining the economic and technological feasibility of imposing certain structural requirements in light of the findings contained in the revised regulatory assessment. The Coast Guard also intends to carefully consider all comments received from the public on this analysis of the revised regulatory assessment, and determine whether any structural measure is both economically and technologically feasible.

Background and Purpose

The Coast Guard recognizes that operational and structural measures perform unique and important functions to prevent oil pollution. The second phase of the Coast Guard's three-phase effort to establish measures for existing tank vessels addresses reducing the risk of a grounding, collision, or fire. Many pollution incidents from tank vessels can be prevented by applying operational measures. Common failure modes which lead to pollution incidents include personnel error, navigation problems, and improper maintenance practices. A separate SNPRM entitled ''Operational Measures to Reduce Oil Spills From Existing Tank Vessels Without Double Hulls'' (Operational Measures SNPRM) (60 FR 55904; November 3, 1995) proposes requirements for bridge resource management training, vessel specific training, rest hour minimums, enhanced structural surveys, maneuvering performance capability requirements, and other requirements aimed at reducing the risk of accidents involving existing tank vessels.

The Coast Guard's third phase of this effort to reduce oil pollution from certain existing tank vessels addresses mitigation of pollution if an accident occurs. The Coast Guard evaluated those structural measures that would reduce the oil outflow on various existing vessel designs. This analysis included measures such as fitting double bottoms or sides, requiring hydrostatic-balanced loading (HBL) for all vessel configurations, and fitting segregated ballast tanks (SBTs) or clean ballast tanks (CBTs) on those vessels presently without them.

Discussion of Comments and Changes

Background information on proposals for structural measures for existing vessels without double hulls is provided in the preambles to the ANPRM and NPRM. These proposals focus on measures to reduce oil outflow after a collision or grounding has occurred.

The Coast Guard received 132 comments on the Existing Vessels NPRM. Thirty of these comments related to the operational measures phase of this rulemaking project while the remaining 102 comments discussed issues related to reducing the oil outflow on an existing tank vessel after an accident occurs. The following discussion summarizes the comments received on the NPRM and is divided by topic: (1) applicability and treatment of existing double hull or double bottom vessels, (2) consistency with international standards, (3) protectively-located spaces (PL/spaces), (4) hydrostatic-balanced loading (HBL), (5) protectively-located segregated ballast tanks (PL/SBT) requirements, (5) alternative measures, (6) phase-in alternatives and economic incentives, (7) regulatory assessment—general, (8) regulatory assessment—costs, and (9) regulatory assessment—benefits.

1. Applicability and Treatment of Existing Double Hull or Double Bottom Vessels

The Coast Guard received one comment that inquired about the lightering zones referred to in section 4115 of OPA 90. The comment questioned how the lightering zones would impact the vessels that are required to comply with structural requirements for existing tank vessels. The Coast Guard issued a final rule on August 29, 1995, entitled ''Designation of Lightering Zones'' (60 FR 45006), which established four lightering zones in the Gulf of Mexico. Under the provisions of the final rule, tank vessels without double hulls may lighter in the Exclusive Economic Zone (EEZ) in these zones, including the existing vessels affected by this rulemaking. These vessels would be allowed to continue conducting lightering operations in these zones after they are phased out of service under the provisions of section 4115(a) of OPA 90 until 2015. However, under section 4115(b) of OPA 90, these vessels would also be required to meet any structural and operational measures for tank vessels without double hulls.

Another comment indicated that States should not attempt to preempt this proposed Federal regulation. The Coast Guard works closely with local and State governments and encourages them to actively participate in its regulatory process. There should be no conflict between State and Federal law; however, to the extent there is such a conflict, Federal law remains supreme (U.S. CONST. art. VI, cl. 2).

On comment stated that the more limited definition of oil used in this rulemaking, which excludes animal fats and vegetable oils, should apply to all OPA 90 regulations. Other comments requested the exemption of vessels which carry non-persistent oils. The NPRM specifically excluded vessels carrying only animal fats and vegetable oils because the proposed structural requirements were believed to be too costly for vessels carrying only non-petroleum oils. Additionally, the exemption was proposed in an effort to be consistent with the international structural measures for existing vessels established in MARPOL 73/78. The Coast Guard has determined that the application of some of the structural measures presented in this SNPRM is technologically feasible for all existing tank vessels. Comments on the economic feasibility of imposing structural measures on vessels that carry only non-petroleum oils are solicited. The Coast Guard also requests comments on the benefits that may result from structural requirements. It should be noted that the Operational Measures SNPRM (60 FR XXXX; date) proposes the application of operational measures to all existing tank vessels, including non-petroleum oil carriers.

Several comments requested clarification on whether the proposed rulemaking would apply to vessels operating in the U.S. EEZ and to vessels that carry cargo to foreign destinations. One comment asked whether the rulemaking would apply to vessels that unload cargo at deepwater ports or that engage in lightering in U.S. waters. The Coast Guard determined that any operational or structural measures reulemaking implementing section 4115(b) would be consistent with the applicability section 4115(a) of OPA 90 which requires certain existing tank vessels without double hulls to be phased out of operation by 2015. Therefore, this SNPRM would apply to vessels unloading cargo at deepwater ports or engaging in lightering in U.S. waters. It would also apply to any other existing tank vessel without a double hull that is required to be phased out under section 4115(a) of OPA 90.

The Coast Guard rulemaking implementing section 4115(a) entitled ''Double Hull Standards for Vessels Carrying Oil in Bulk'' (CGD 90–051) (60 FR 13318; March 10, 1995) added 33 CFR 157.10(d), which applies the regulations to certain tank vessels carrying oil in bulk as cargo operating in U.S. waters, including vessels unloading oil as cargo at deepwater ports and lightering in established lightering zones more than 60 miles from the territorial sea baseline. The regulations also apply to non-dedicated oil spill response vessels (OSRVs). The Navigation and Inspection Circular (NVIC) 10–94, ''Guidance for

Determination and Documentation of the Oil Pollution Act of 1990 (OPA 90) Phase-out Schedule for Existing Single Hull Vessel Carrying Oil in Bulk,'' provides a detailed explanation of the applicability of section 4115(a). Without conclusively resolving all the complex interplay between the Oil Pollution Act and the Law of the Sea, the Coast Guard presently intends that operational and structural requirements would not apply to foreign tankships engaged in innocent passage on U.S. navigable waters, which includes the territorial sea of the United States and the EEZ.

One comment requested clarification on whether structural measures would apply to Floating Production and Storage Off-loading (FPSO) Systems, Floating Production Systems (FPS), and Mobile Offshore Drilling Units (MODUs). FPSO systems and FPS are tank vessels; however, they would be excluded from this rulemaking if they are less than 5,000 GT, are not engaged in the movement of petroleum oils, and are not used in lightering operations. MODUs are not included under the definition of tank vessel in OPA 90. Therefore, they would not have to comply with structural measures.

One comment asked why the NPRM differentiated between crude tankships of 20,000 deadweight tons (dwt) or more and product carriers of 30,000 dwt or more. The NPRM reflected the distinction in vessel size made by Regulation 13G of Annex I of MARPOL 73/78. This distinction was continued in the regulatory assessment in this SNPRM to enable those companies operating vessels on international routes to compare estimated cost and benefit results.

The Coast Guard received several comments which objected to the imposition of structural measures on tank barges. The regulatory assessment in this SNPRM reviewed several technologically feasible measures that could be implemented on barges to reduce oil outflow. Comments are solicited on the economic feasibility of these measures.

The Coast Guard received one comment on the double hull requirements proposed in § 157.410(a) of the NPRM. The comment recommended the immediate construction of double hull vessels in lieu of retrofitting existing vessels with structural measures. Section 4115(a) of OPA 90 establishes a phase-in schedule for double hull requirements for all existing tank vessels. These section 4115(a) provisions establish a schedule that balances environmental safety with the overall impact on the U.S. economy, worldwide U.S. shipping capability, and oil availability to U.S. consumers. The Coast Guard does not have the authority to change the phase-out schedule of section 4115(a); rather, it is tasked with issuing interim regulations to protect the marine environment until all vessels are required to be equipped with double hulls under section 4115(a).

2. Consistency With International Standards

The Coast Guard received several comments which expressed support for the development of regulations that are equivalent to Regulation 13G of Annex I of MARPOL 73/78. Another comment stated that for 70 percent of the fleet that it applied to, the NPRM duplicated the requirements of the proposed Regulation 13G of Annex I of MARPOL 73/78. The comment further stated that the Coast Guard has neglected its responsibility to make an independent decision to designate the strongest feasible antipollution measures. As previously stated, the Coast Guard's goal is to implement its statutory mandates in regulations that are consistent with international regulations wherever doing so is lawful, appropriate, and practical. Based on comments from the NPRM, the Coast Guard has reevaluated various pollution prevention measures. Accordingly, the Coast Guard conducted an extensive cost and benefit analysis of structural measures that are both consistent with international standards and that exceed current international agreements. The regulatory assessment in this SNPRM reflects the structural measures deemed technologically feasible for existing tank vessels.

One comment recommended that product tankships from 20,000 dwt to 30,000 dwt be exempted from further rulemaking action because they presently comply with MARPOL 73/78 and the Port and Tanker Safety Act of 1978. The comment contended that these tankers would already be in compliance with the provisions of the published NPRM. The above statements are accurate; however, the Coast Guard also considered requirements above those of MARPOL for the regulatory assessment in this SNPRM and has continued to include this group of vessels to ensure it reflects accurate cost benefits.

3. Protectively-located Spaces (PL/Spaces)

The Coast Guard received several comments on the proposed requirements for PL/spaces. In the NPRM, a PL/space includes any tank or void space that is not used for the carriage of cargo, cargo residue, slops, dirty ballast or fuel oil. The protectively-located (PL) qualifier refers to the distribution of these spaces along the length of the vessel's hull as described in Appendix C to 33 CFR 157. One comment stated that a requirement for oil-free spaces has already been in effect under international rules and corresponding U.S. law that covers all vessels except for small tank vessels built since 1979; thus, the comment contends, the proposed requirement for PL/spaces would provide no additional improvement for nearly 30 percent of the world's single hull tanker fleet. Another comment contended that approximately 75 to 80 percent of the world fleet of crude carriers consists of tankers that are not fitted with SBT or CBT (pre-MARPOL tankers). The comment indicated that HBL with a safety factor of 1.0 or less, as used in Regulation 13F of MARPOL, is more economical and technically viable in the case of groundings than the originally proposed PL/spaces for these vessels.

The Coast Guard focused its analysis for this SNPRM on determining what would happen if various PL/space requirements were applied to pre-MARPOL vessels. In this assessment, it took into account whether the pre-MARPOL vessels are fitted with SBT or CBT. This SNPRM summarizes a revised regulatory assessment and solicits comments on the economic feasibility of requiring pre-MARPOL tank vessels to be fitted with PL/spaces as compared to HBL.

One comment stated that requiring PL/spaces on non-SBT tankships would lead to greater oil outflow in a grounding or collision. Another comment indicated that, based on recent calculations performed by the oil tanker industry on ships of different sizes, PL/spaces are capable of achieving an improvement in estimated oil outflow reduction, provided certain operating conditions are maintained. The Coast Guard agrees with both comments. When PL/spaces are used in such a way that they result in an increased freeboard, oil outflow in groundings could be expected to increase. However, the use of PL/spaces, in such a way that the operational freeboard is essentially unchanged (by ballasting the PL/spaces), will result in reduced oil outflow. As suggested by several comments, the Coast Guard modified its original assessment and considered the implementation of PL/spaces made in conjunction with HBL.

One comment questioned whether ships that are fitted with SBTs in accordance with the provisions of Regulation 13E of Annex I of MARPOL 73/78 would be accepted as meeting the provisions of § 157.410(a) in the NPRM as it applies to the provision of side or bottom protection. The comment indicated that under a strict interpretation of the provisions of § 157.410(a) of the NPRM, these vessels would not be in compliance with the proposed requirement. The intent of the NPRM proposal was that any vessel in compliance with Regulation 13E of Annex I of MARPOL 73/78 would also be in compliance with proposed 157.410(a) of the NPRM.

One comment recommended that existing tank vessels be fitted with PL/spaces that protect 100 percent of the cargo tank length encompassing the full depth of each side. The comment suggested that the benefits would include a significantly reduced likelihood of oil outflow and greater use of surplus tonnage for pollution control. The comment stated that this would also accelerate a replacement program with double hull tankers as freight rates rise and estimated that existing tankers would have about the same operating cost as a new double hull tanker. The Coast Guard analyzed the retrofit of full double sides, which may be interpreted as fitting PL/spaces along the length of the vessel, and presents the results in the regulatory assessment in this SNPRM. Comments on the economic feasibility of this measure for existing tankships are solicited.

One comment stated that both the preamble and proposed rule explicitly state that PL/spaces must either protect 30 percent of each side or 30 percent of the bottom of the vessel. The comment stated that more consideration should be given to all around protection, especially in cases where a vessel falls short of the NPRM's proposed PL/space requirement. The NPRM proposed PL/spaces in this proportion because doing so is consistent with existing international standards. The Coast Guard continued to consider this arrangement in the regulatory assessment of this SNPRM, and also considered more stringent variations of PL/space protection.

One comment questioned whether a non-SBT tank vessel would be able to use its full cargo carrying capacity when trading outside the U.S. EEZ, and whether it would be accepted as meeting the proposed provisions of the NPRM if certain cargo tanks are simply left empty when trading in U.S. waters. The comment suggested that tanks that are normally used for carrying cargo during worldwide trading could be converted to void spaces for U.S. trading if adequate crude oil washing, full gas freeing, and blanking of pipelines leading to the tanks are accomplished. According to the comment, these operations could be witnessed by a classification society which could issue voyage certificates listing the tanks as void or SBT spaces. Blanks could be removed for resuming worldwide trading. For non-SBT tank vessels, simply leaving certain cargo tanks empty is one of the measures considered in the regulatory assessment in this SNPRM. As explained in the discussion on applicability, there are also certain circumstances in which a non-SBT tank vessel could be able to carry a full cargo load and engage in U.S. trade. While it is technologically feasible to take tanks out of service and reduce oil outflow, comments are solicited on the economic feasibility of this practice. Comments that propose enforcement mechanisms for this type of measure are also requested.

One comment recommended that PL/spaces be required to protect against collisions by permanently filling them with ballast water. The Coast Guard has focused this phase of the rulemaking on reducing oil outflow after an accident. The regulatory assessment in this SNPRM evaluated PL/spaces in unballasted, HBL, and full-ballast states to determine the effects on oil outflow. While oil outflow is reduced when the vessel is completely ballasted down, the practice also causes cost increases due to possible port draft restrictions and may compound a vessel's grounding risk. Comments are solicited on this SNPRM's assessment of the different ballast states as they are combined with PL/spaces and the economic feasibility of such combinations.

One comment stated that locating all PL/spaces forward could lead to unacceptable levels of trim or stress on some ships. On most tank vessel designs, the most technologically feasible place to install PL/spaces is in the tankship's midbody; however, due to unique design considerations and the need to vary a vessel's draft or cargo carrying capacity based on the route traveled, the Coast Guard does not intend to require PL/spaces be located in a particular part of a ship.

4. Hydrostatic-Balanced Loading (HBL)

The Coast Guard received several comments concerning the HBL option proposed in the NPRM. Two comments stated that the NPRM must require HBL as a minimum measure to effectively provide ''as substantial protection to the environment as is economically and technologically feasible.'' The Coast Guard recognizes HBL as an effective outflow reduction measure and included it in several forms for the regulatory assessment in this SNPRM. The assessment considers HBL as a technologically feasible measure for all existing tank vessels, even those presently meeting MARPOL 73/78 requirements. Comments on the economic feasibility of HBL requirements are solicited.

The Coast Guard received one comment stating that requiring specific structural or operational measures like HBL, which force ships to change loading or operational practices from one trade to another, are unsafe because of an increase in the opportunity for human error. The concerns expressed in the comment are valid; however, the degree of human error that would be introduced into the vessel's procedures depends on several factors. An example could be a poorly worded loading procedure which complicates loading and increases accident risk to a tank vessel. The Operational Measures SNPRM (60 FR 55904; November 3, 1995) attempts to mitigate the risk of human error that could be incurred by complex or confusing loading instructions. In contrast, the regulatory assessment in this SNPRM assumes that adequate operational measures are in place to mitigate this type of potential human error and only considers HBL for its potential oil outflow reduction capabilities. The Coast Guard solicits comments on quantifying the negative effect that HBL could cause due to frequent loading adjustments.

Several comments expressed concern that the Coast Guard is imposing measures, such as HBL, on ships for which they were not designed and could be introducing hull bending stresses which exceed classification society standards. The Coast Guard studied the structural consequences of the measures proposed in the NPRM, in terms of hull bending moments, and concluded in the regulatory assessment for this SNPRM that, in general, excessively high global stress levels due to HBL should not be a problem. The technical feasibility of HBL is assumed based on hull bending stresses and sloshing loads. However, in some cases, unacceptably high local stresses may be created due to HBL. The Coast Guard solicits comments on specific cases in which local stresses would exceed maximums set by recognized classification societies.

One comment stated that the formula for HBL presented in the NPRM was based on the draft guidelines for alternatives required under Regulation 13G of Annex I of MARPOL 73/78. The comment stated that use of the formula for HBL results in a high loss of cargo carrying capacity. Further, the comment states that the original formula was based on the height of an intermediate oil-tight deck on a tankship fitted with double sides, and may not be suitable for application to the definition of HBL in the context of existing tankers. The Coast Guard believes that the definition of ''hydrostatic-balanced loading'' used in the NPRM should not be used. The IMO has finalized the guidelines concerning the implementation of HBL and modified the original definition. A factor of 1.0 replaced the original factor of 1.1. Consequently, the Coast Guard has used the definition of ''hydrostatic-balanced loading'' that is consistent with the guidelines developed by the IMO for the regulatory assessment in this SNPRM.

Another comment suggested the use of HBL combined with PL/spaces as an alternative to applying HBL to all tanks. The Coast Guard presents several combinations of PL/space and HBL in the regulatory assessment for this SNPRM and solicits comments on them.

One comment stated that 50 percent of all tankship collision damage is located above the waterline only; therefore, vessels should be required to load their side tanks only to the waterline level. The comment stated that if side tanks were filled using HBL procedures, and 40 percent of the cargo was carried in the side tanks, all spills due to grounding would be reduced by 40 percent in the case of a grounding. The Coast Guard's probabilistic oil outflow analyses, as described in ''Interim Guidelines for the Approval of Alternative Methods of Design and Construction of Oil Tankers Under Regulation 13F(5) of Annex I of MARPOL 73/78'' (IMO Marine Environmental Protection Committee's Resolution MEPC 37/14; December 23, 1994), of various measures, including HBL, is assessed in this SNPRM. Comments are solicited on the oil outflow reduction estimates achieved through HBL and the resulting costs associated with the reduction.

One comment suggested that the Coast Guard place a notation in 33 CFR 157, subpart G, that states that structural increases or modifications to the cargo area of a vessel may be necessary to apply HBL when a vessel receives cargo. Another comment stated that the high tensile steel used in some ships may not be suitable for the fatigue effects that could result from HBL. Other comments expressed concerns about using HBL because of the possibility of sloshing. The Coast Guard recognizes that when employing HBL, in some cases, it may be necessary to retrofit swash bulkheads or modify the vessel's structure to reduce the effects of fatigue. Prior to applying HBL, the owner or operator of a loading tankship would have to evaluate the effects of HBL on a tankship's cargo tanks and structure to determine if swash bulkheads or other modifications are necessary. The regulatory assessment in this SNPRM did not consider shipyard cost for the modifications needed to accommodate HBL. Comments are solicited on specific structural modifications and their anticipated added shipyard cost, if any, for HBL measures.

One comment expressed concern that HBL may raise the risk of spillage due to an increase in total sailings resulting from reduced unit cargo loading. The oil outflow benefit analyses summarized in this SNPRM does not directly account for the effects of increased traffic due to reductions in cargo carrying capacity. Another comment stated that the benefits for all structural measures were overestimated because they did not reflect the added risk of an accident due to an increase in traffic volume. Historical accident data was used to estimate how much oil is spilled annually as a result of accidents. Estimated cargo shutout from measures similar to Regulation 13G of Annex I of MARPOL 73/78 reveal that the resultant increase in tank vessel traffic would be 12 percent. While this traffic increase could also increase accident risk, it represents approximately a 2 percent increase in the total U.S. port deep draft traffic volume. It is reasonable to assume that this small increase in traffic volume would be offset by the accident reduction measures implemented through the Coast Guard's proposed Operational Measures (60 FR 55904; November 3, 1995.

One comment inquired as to whether a load line would be necessary to enforce the use of HBL. The Coast Guard did not propose any changes to the International Convention on Load Lines, 1966, within the NPRM. If an HBL requirement is deemed economically feasible, it could be enforced using a number of methods. A tankship's master could be required to ensure that the ullage measurement reports or other tank gauging reports are recorded, kept in the Oil Record Book, and available for examination. Additionally, a visual inspection of draft marks should be sufficient to determine if a vessel has employed HBL loading procedures. The Coast Guard requests comments on the best way to determine whether a vessel is in compliance with its HBL loading plans.

One comment stated that, for ultra large crude carriers (ULCCs) and very large crude carriers (VLCCs) operating at offshore terminals, the risk of grounding is limited; however, collision is the most likely accident to occur. The comment proposed that, for these vessels, a very safe method of operation would be to HBL only the side cargo tanks. The Coast Guard disagrees. For collisions, the use of PL/spaces is necessary to reduce oil outflow. HBL provides added oil outflow protection only in groundings. If a collision were to cause the side of a large tankship to be pierced and a cargo tank to be ruptured, the hydrostatic head, which acts in balance with the seawater, would be lost; thus, oil would flow out of the tank.

5. Alternative Measures

The Coast Guard received several comments which encouraged it to adopt alternative systems to reduce oil outflow. These include emergency rescue and emergency transfer systems, resilient membranes, vacuum and underpressure systems, independent tanks, and intermediate oil tight decks. Alternative measures to prevent oil outflow are viable in some applications. For the regulatory assessment in this SNPRM, specific alternative measures were not researched. Cost assessments for alternative measures vary greatly. While there are indications that some of these measures could be less costly than PL/spaces or HBL, they were not included in the regulatory assessment because none of them meet the benchmark equivalency for alternative compliance found in ''Guidelines For Approval of Alternative Structural or Operational Arrangements as Called for in Regulation 13G(7) of Annex I of MARPOL 73/78,'' Resolution MEPC.64(36) adopted on November 4, 1994. These guidelines include oil outflow criteria that must be met for certain damage assumptions and general operational and safety points such as exposure of the tanker to stress, creation of fire or explosion hazards, stability considerations, and loading requirements. The Coast Guard solicits comments on these alternative measures. Specifically, the Coast Guard requests comments on whether they meet or exceed the IMO guidelines, whether they have been submitted and approved by IMO's Marine Environment Protection Committee (MEPC), and whether they are economically and technologically feasible.

Four comments recommended that the Coast Guard include provisions for using alternative systems to provide flexibility in complying with the requirements for structural measures. One comment suggested that the Coast Guard adopt the recommendations of the National Research Council report entitled ''Tanker Spills: Prevention by Design,'' which encourages the adoption of multifaceted measures such as a combination of PL/spaces and HBL. Another comment stated that the regulation should provide an owner or operator with a choice of equivalent measures so that the owner or operator may select the best arrangement for each ship in his or her fleet. The third comment stated that the NPRM should describe the results that a system should achieve, or quantitative measures of effectiveness, instead of mandating a single structure measure. The fourth comment stated that the proposed alternative oil outflow prevention measure provision grants total discretion to the Coast Guard without providing any criteria for the alternative measure, such as ensuring that it is at least as environmentally protective as the specified measure for the type and size of tankship under review.

The regulatory assessment in this SNPRM analyzes multifaceted measures such as combining PL/spaces with HBL and SBT with HBL. The Coast Guard still considers alternatives to, or choices between measures viable and solicits comments on the measures that should be deemed equivalent and their economic feasibility. Additionally, the Coast Guard is reviewing the performance criteria in the IMO alternative guidelines and encourages comment on them. The Coast Guard views the following safety requirements as key in this type of system equivalency evaluation: the human interface required by the operator to control the system: the operational complexity and increased burden placed on the operating crew as a result of working with an inherently complex system that would increase the probability of a spill due to human error; the added potential for fire and explosion, including the performance of the inert gas and vapor recovery systems (if installed) once the alternative measure has been installed; the adverse impact on intact and damage stability; the adverse impact the installed alternative measure has on structural strength, including sloshing loads and the need to fit large structural fixtures in existing tank structures; and the overall consideration of the operational history of the alternative and its components.

The Coast Guard received several comments which suggested that response systems be fitted as alternative measures to the ones proposed in the NPRM. These systems have already been evaluated in ''Discharge Removal Equipment for Vessels Carrying Oil'' (58 FR 67988; December 22, 1993). The alternatives considered in this SNPRM are passive pollution prevention systems, not spill response systems which require human or machine intervention following a collision or grounding. The Coast Guard has implemented several response oriented requirements including Vessel Response Plans (58 FR 7424; February 5, 1993) and the discharge removal requirements and believes that the structural measures intended by section 4115(b) should be addressed through vessel design or passive protection.

6. Phase-in Alternatives and Economic Incentives

The Coast Guard received several comments regarding the 3-year phase-in provision that was proposed in the NPRM. One comment stated that the 3-year phase-in period would result in the acceleration of shipyard schedules, higher costs, and tonnage restraints. The comment contended that the 3-year phase-in schedule would be economically overburdensome on the tankship owner because it would require many vessels to be removed from normal service to perform the modifications required by the proposed rulemaking. The assessment for this SNPRM reflects cost estimates associated with removing the vessel from service for an extended shipyard period. However, no shipyard scheduling constraints were considered. Comments on this phase-in cost and specific shipyard availability constraints are solicited.

Many comments expressed concern that the original proposed 3-year phase-in period was too generous. One comment expressed concern that no action would be taken by industry and the Coast Guard to reduce oil spills and pollution during this period. Other comments stated that the proposed phase-in period penalizes operators who have already invested in modern double hull vessels because it reduces the cost of single hull vessel operation. One comment contended that a vessel should be required to retrofit during the regularly scheduled drydocking period which immediately follows the issuance of the final rule.

The Coast Guard has taken action to implement interim measures for existing tank vessels by issuing regulations for emergency lightering equipment and advanced notice of arrival requirements (59 FR 40186; August 5, 1994) and proposing regulations for operational measures (60 FR 55904; November 3, 1994; STD). These two efforts will reduce the risk of oil discharges from existing tank vessels that do not have double hulls, regardless of the outcome of the feasibility assessment for structural measures. Since a tank vessel on an ocean or international route is required by its flag administration or classification society to drydock twice every 5 years, the 3-year phase-in schedule proposed in the NPRM reflected an implementation period comparable to one for the regularly scheduled drydocking period immediately following the issuance of the final rule. The Coast Guard requests comments on the economic feasibility of the 3-year phase-in period versus a 5-year period or a 1-year period. Comments are also requested on an appropriate phase-in period for those measures that do not require drydocking. The regulatory assessment for this SNPRM estimates that a 60,000 dwt pre-MARPOL vessel's annualized value and cost is $273,000 less for its estimated 5 remaining years than its counterpart double hull vessel which can operate indefinitely.

One comment stated that the 3-year phase-in schedule for Regulation 13G is flawed. The comment contended that newer vessels should be allowed a longer time period to comply with the proposed structural requirements. The comment stated that for these vessels, the risk to the environment should be commensurately lower, provided the vessels have been properly maintained. Oil outflow can be reduced even on newer single hull vessels meeting MARPOL 73 or MARPOL 78 requirements as shown by the regulatory assessment in this SNPRM. While it is true that the oil outflow reduction benefits presented in this SNPRM for vessels fitted with SBT or CBT are less than for pre-MARPOL tankers, they exist. Comments are requested on possible phase-in periods for vessels fitted with SBT or CBT that, in light of the benefit analysis presented in this SNPRM, would be economically feasible.

One comment contended that the phase-in period would place U.S. vessels at a significant disadvantage in relation to foreign vessels. The comment stated that U.S. vessels were required to retrofit SBTs in accordance with the Port and Tanker Safety Act of 1978, and would already be in compliance with the proposed SBT requirements of the NPRM. The comment indicated that the proposed phase-in period would provide foreign vessels with additional time to retrofit SBTs. Section 4115(b) of OPA 90 requires the Coast Guard to issue this rulemaking so that it is economically feasible for both U.S. and foreign tank vessels. The Coast Guard solicits comments on the economic feasibility of a phase-in period for foreign tank vessels that is shorter than 3 years.

One comment expressed concern that the NPRM does not provide incentives to tanker owners for pursuing and adopting new technologies. The comment stated that shipowners' budgets generally do not include monies for pure research, and without clear incentives to embrace new technologies, there is a small chance that vessel owners will use them. The comment urged the Coast Guard to amend the proposed rule to include specific incentives to encourage the industry to develop and adopt such technologies. Another comment stated that many vessel owners already are operating with double hull vessels and/or SBTs. The comment stated that companies using these vessels should receive pollution credits. Additionally, the comment contended that pollution credits should be issued to owners who build new tankers or significantly upgrade existing tankers. The comment stated that these credits could be traded for debits to continue using existing tankers with little modification. Similarly, another comment stated that owners who build new tankers should receive tax credits. Issuing monetary incentives for company research, granting pollution credits to a company to support uneven implementation of oil outflow reduction measures among their fleet, or granting tax credits for companies that comply with requirements are beyond the authority and scope of this rulemaking.

7. Regulatory Assessment—General Comments

Several comments questioned the assumptions made in the Regulatory Impact Analysis (RIA) performed by Mercer Management Consulting, Inc. for the NPRM. One comment stated that the RIA for the NPRM does not take into account the barrels of oil saved from spillage by other OPA 90 rules. The Coast Guard has developed a wide range of regulations mandated by OPA 90 to implement provisions pertaining to spill prevention, mitigation, cleanup, and liability. To facilitate the rulemaking process, the Coast Guard has divided rulemaking requirements into relatively small, individual rulemaking projects and has prepared regulatory, environmental, regulatory flexibility, and paperwork analyses for each project. To expedite effective rulemaking, the Coast Guard analyzed each project as a stand alone rulemaking. Recognizing that there are interactive effects of the suite of OPA 90-derived regulations, the Coast Guard has begun a programmatic regulatory assessment for the OPA 90 rulemaking projects.

One comment stated that the RIA for the NPRM assumed that all the work for structural modifications can be done during a normal drydocking period. The comment contended that this is not correct because the cleaning for hot work entails a much higher degree of cleaning and more lost service time. The Coast Guard recognizes that additional cleaning and gas freeing would be necessary to perform structural modifications and has included the cost of an extended drydock in the regulatory assessment for this SNPRM.

One comment disagreed with the assumption that some existing ships will be replaced rather than converted. The results of the assessment conducted for this SNPRM indicate that no vessels are expected to be replaced early as a result of the measures researched.

One comment disputed the size of the international vessel population assumed in the RIA. The comment stated that the international fleet affected by the NPRM would range from 1,500 to 2,000 vessels, not the 300 or 400 assumed in the RIA. The regulatory assessment in this SNPRM revises the NPRM vessel population numbers, based on the number of tankships applying for a Certificate of Financial Responsibility, excluding certain tankships such as double hull tankships. The RIA for this SNPRM estimates that there are a total of 1,085 existing tankships likely to be affected by this SNPRM.

Several comments stated that the assumption made in the NPRM RIA that newer vessels that comply with MARPOL Regulation 13G will be allocated to U.S. trades in the same proportion as non-complying vessels is inaccurate. The comments went on to state that the number of newer vessels operating in the U.S. trade is higher because of the Port and Tanker Safety Act of 1978. The comments contend that the existing fleet of vessels meeting either MARPOL PL/SBT standards or having double hulls is already sufficient to carry all U.S. cargo. One comment stated that the NPRM proposals would have a devastating impact on the product tanker market. Another comment stated that there was no consideration in the NPRM for a company's ability to secure adequate capital to replace existing vessels with double hull vessels. The vessel population and U.S. coastal trade population affected by this rulemaking were reconsidered for the regulatory assessment in this SNPRM. Build dates were also researched and correlated with trade estimates. Neither the ability of the existing fleet of double hull or MARPOL PL/SBT tankers to meet U.S. import needs nor a company's ability to secure funding is influential for this rulemaking. Comments are solicited on the specific economic feasibility of these measures on product tankers.

8. Regulatory Assessment—Costs

Comments on the Existing Vessels NPRM and from the public meeting expressed concern about the accuracy of the costs and benefits stated in the Regulatory Impact Assessment (RIA). The comments indicated that the costs, in some cases, were not fully developed. Comments included concern over using only two ship sizes to calculate the cost, the assumption that there will be minimal cargo capacity loss across the fleet, the gross underestimate of compliance costs for tank barges, the potential adverse costs to vessels which carry non-persistent oils, and the 3-year phase-in costs as compared to following the MARPOL 73/78, Regulation 13G schedule. After reviewing the comments, the Coast Guard redirected its approach, expanded the vessel models used in the cost analysis, and revised its assessment to reflect these comments.

The Coast Guard received several comments regarding the economic feasibility of the regulations. One comment stated that Congress made it clear that all regulations should be economically feasible. The comment stated that requiring industry to spend $573 million over a 3-year period for unknown environmental benefits would be pressing the intent of Congress. Another comment stressed that a requirement that a measure be economically feasible does not mean that it must be the least expensive. Pollution prevention benefits are measured as a ratio of cost per barrel of oil not spilled. The most desirable measures would be those that prevent the spillage of the greatest number of barrels of oil at the lowest cost. The Coast Guard recognizes that a measure can be costly; however, if it provides a significantly improved degree of protection in terms of barrels of oil not spilled, it may still be cost effective. The Coast Guard solicits comments on the cost effectiveness of the measures presented in this SNPRM.

One comment noted that when retrofitting PL/spaces on vessels in the 80,000 dwt to 300,000 dwt range, there is a loss of approximately 15 percent of the cargo volume. The comment further stated that for an 80,000 dwt vessel without SBT, there is a loss of approximately 29 percent of the cargo volume. A tank vessel owner commented that if the company's VLCCs were required to be converted to PL/SBT or PL/spaces, the company would lose more than $1 million of revenue per year, and that a medium size crude carrier could have a $500,000 reduction in revenue per year. The comment stated that this would change the economic formulas for the company's fleet and would force the company to lay up or sell half of its fleet because it would no longer be economically feasible to operate the vessels. Another comment stated that the capital costs and lost cargo capacity costs for dedicated PL/spaces or HBL would be much higher for most ships than the amount estimated in the NPRM RIA because many existing vessels would be required to have their cargo compartments structurally refit to accommodate a 30 percent PL/Space requirement of the NPRM. The Coast Guard recognizes this argument and includes a revised cargo shutout estimate in this SNPRM assessment. Comments on the regulatory assessment for this SNPRM and the economic feasibility of the measures within it are solicited.

The Coast Guard received several comments on the economics of requiring HBL for existing tank vessels. One comment stated that requiring HBL would be economically burdensome. Four comments questioned the NPRM's statement that HBL was not economically feasible. Three comments stated that HBL could be implemented without costly structural modifications. One comment added that the most costly structural modification would be the installation of swash bulkheads; however, the comment stated that it has been demonstrated that swash bulkheads are not necessary in most cases. Two of the comments stated that HBL is economically feasible because the reduced cargo carrying capacity requires more trips to be made. The comment contended that as a result of the need to make more voyages to haul a given amount of cargo, more revenue would be generated and the market demand for tankers would increase. Cargo shutout and structural refit needs for HBL implementation were revised and are presented in the regulatory assessment in this SNPRM. Comments on the economic and technological feasibility of the different HBL measures discussed within this SNPRM are solicited.

One comment stated that the NPRM RIA's estimate of $4 billion for the present value of total compliance for HBL over 20 years could readily be financed by the major oil companies out of annual profits. The comment stated that, traditionally, the oil industry has passed on a doubling or even a tripling of the price of crude oil, as well as the price of its transportation, and could do so for this rulemaking. Section 4115(b) tasked the Coast guard with implementing interim structural and operational measures that were technologically and economically feasible. The definitions of these two qualifiers were not developed within OPA 90 or its associated documents. The Coast Guard has researched structural measures deemed technologically feasible and is publishing this SNPRM assessment in order to receive comments on their economic feasibility. After the comment period for this SNPRM has closed, an assessment of the economic feasibility for structural measures will be done and further action will be taken accordingly. Specific comments justifying why a measure is either economically infeasible or how it could be feasible are solicited.

9. Regulatory Assessment—Benefits

The Coast Guard received several comments questioning the accuracy of the benefit estimates presented in the NPRM. Many comments stated that, in general, the benefits specified in the NPRM RIA were overstated. Four comments stated that the effectiveness estimates were not accurate. One comment specifically indicated that projected effectiveness for PL/spaces, the Underpressure System (UPS),the Emergency Rapid Transfer System (ERTS), and the Emergency Rescue System (ERS) were extremely optimistic. Other comments stated that the estimated effectiveness of SBT was correct as presented in the tables but underestimated within the NPRM text. Another comment stated that the benefits associated with PL/spaces were significantly understated in the NPRM because the costs for cleanup, third-party claims, and damage to natural resources were not included.

The Coast Guard reviewed the NPRM RIA and has revised the benefit assessment for certain measures presented in the NPRM. It has also added benefit analysis on other structural measures and presents a summary in this SNPRM. The costs associated with third-party cleanup and damage to natural resources were not considered because the Coast Guard reviews benefits as the amount of oil not spilled rather than a dollar value. Details on the extensive work the National Oceanic and Atmospheric Administration has done on this subject can be found in its NPRM entitled, ''Natural Resources Damage Assessments; Proposed Rule'' published on August 3, 1995 (60 FR 39804). Comments are solicited on the revised benefits assessment for this SNPRM.

Other comments argued that PL/spaces would not reduce oil outflow by 30 percent in collisions as assumed in the RIA. The comment contended that the reduction in oil outflow would be considerably less because collisions do not occur uniformly along the side-shell of a vessel. At the public meeting held on January 20, 1994, a speaker presented his company's conclusions about oil outflow from PL/spaces based on probabilistic investigations and analyses, as described in ''Interim Guidelines for the Approval of Alternative Methods of Design and Construction of Oil Tankers Under Regulation 13F(5) of Annex I of MARPOL 73/78'' (IMO Marine Environmental Protection Committee's Resolution MEPC 37/14; December 23, 1994). The results indicated that PL/spaces, when retrofitted on a non-SBT tankship, would result in a higher oil outflow when compared to the outflow of the same tankship that has not been fitted with PL/spaces. The speaker indicated that retrofitting PL/spaces on a non-SBT tankship would create a higher freeboard, which would result in greater oil outflow if the vessel's hull were to become damaged. The Coast Guard agrees that the effectiveness of PL/spaces as assumed in the NPRM RIA may have been overstated. The Coast Guard has conducted further studies to obtain more accurate estimates of the effectiveness of PL/spaces. A summary of the revised benefit estimates for PL/spaces is contained in the regulatory assessment for this SNPRM.

One comment stated that an IMO sponsored model of oil outflow indicated that, for any unprotected tank configuration, it is not possible to attain 100 percent effectiveness in a grounding scenario. The comment contended that within the structural limitations of most existing ships, the UPS system will be substantially less than 100 percent effective and that the NPRM overestimated its effectiveness. The Coast Guard has revised its estimates for the measures presented in this SNPRM. The UPS was not analyzed further; however, the Coast Guard is willing to analyze alternative oil outflow prevention measures if they meet international alternative standards, including safety assessments.

One comment stated that the RIA for the NPRM did not analyze historical incidents. Two comments stated that, without accurate estimates of the number of oil spills and the volume of oil spilled, it is impossible to accurately quantify environmental benefits and costs. The Coast Guard reviewed the historical data used for the NPRM RIA and revised it for the regulatory assessment for this SNPRM. Comments on the revised data are solicited.

Assessment

The methodology for completing the regulatory assessment for this SNPRM employed a two phase process. First, a screening analysis was conducted to evaluate the effectiveness, efficiency, and technological feasibility of certain structural measures on a baseline of analytical tank vessel models. The screening analysis included an estimation of the onetime expense associated with refitting the vessel at a shipyard, called a rough order-of-magnitude (ROM) estimate; the cost of losing cargo carrying capacity due to implementing a measure that would not allow cargo carriage in certain tanks or above certain levels, called cargo shutout; and other costs such as loss of revenue during the shipyard period, called opportunity costs. It also included an estimate of the potential reduction in accidental oil outflow and operational oil outflow for certain measures. For this assessment, operational oil outflow is the oil prevented from being discharged by pre-MARPOL vessels if, instead of being allowed to discharge dirty ballast water, they are fitted with SBT or CBT and are not permitted to discharge dirty ballast water. Vessels are not allowed to discharge dirty ballast water in U.S. navigable waters; however, in accordance with international conventions they may do so in certain areas outside of these waters.

The second phase of this regulatory assessment consists of a detailed analysis conducted to estimate the costs and benefits of those measures which were deemed not only technologically feasible, but also appeared to be the most effective at reducing oil outflow on the affected existing single hull tank vessel fleet. The detailed analysis included a breakdown in costs, benefits, and a cost-benefit analysis over the 19-year period this rule is expected to be in effect.

Screening Analysis

1. General

There were five steps to the screening analysis phase of this assessment. First, baseline analytical tank vessel models were developed that represented the existing single hull tank vessel fleet. Second, selected measures were imposed on four of these analytical tank vessel models and the resultant oil outflow reductions were calculated. Third, cargo shutout, operating costs, and onetime ROM refit costs were developed. Then cost-effectiveness ratios were developed and the results of each measure were correlated with selected baseline analytical tank vessel models. Finally, the ratios were used to rank the measures and identify those combinations of measures and vessel categories that resulted in the lowest cost per barrel of oil not spilled. Table 1 summarizes the combinations of vessels and measures researched for this screening analysis.

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Table 1

Regulatory Alternatives and Baseline Model Combinations

MEASURES	DWT Model Sizes	
	70,000 dwt	264,000 dwt
1.a. PL/Spaces, 30% coverage	Pre-MARPOL	Pre-MARPOL
1.b. PL/SBT, 30% coverage, with ballast to max. feasible draft	Pre-MARPOL	Pre-MARPOL
1.c. PL/CBT, 30% coverage, empty to extent feasible	Pre-MARPOL	Pre-MARPOL
2.a. HBL all tanks	MARPOL '73	MARPOL '73
2.b. HBL, equivalent to Regulation 13G	MARPOL '73	MARPOL '73
3. PL/Spaces as in 1.c. and HBL as in 2.b.	Pre-MARPOL	Pre-MARPOL
4. Retrofit double bottom	MARPOL '73	Pre-MARPOL
5. Retrofit double sides	MARPOL '73	Pre-MARPOL
	31,000 dwt	12,700 dwt
6. PL/Spaces (install bulkheads)	Tank Barge	Tank Barge
7. PL/Spaces using existing cargo tanks	Tank Barge	Tank Barge

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To develop the baseline fleet and its characteristics, several designs were considered. It was assumed that the pre-MARPOL tank vessel had crude oil washing capabilities but no other required MARPOL features. MARPOL 73 tank vessels were assumed to be fitted with SBT, and MARPOL 78 tank vessels were assumed to have PL/SBT. As part of the process of ensuring that the design of the baseline models was appropriate, the baseline tank vessels were investigated for intact stability, longitudinal bending stresses, shear stresses, and sloshing frequencies. It was also assumed that the vessels were constructed to comply with the prevailing American Bureau of Shipping rules when the vessels were built; specifically, the still water bending moment, bending stress, and shear stress values. The resulting average shear stresses and bending moments were satisfactory. The fill depth level to tank depth level ratio for all loading conditions of the vessels investigated did not fall below 75–80 percent, meaning that the sloshing frequencies were not near the roll or pitch periods of the vessels. Resonance can occur in longitudinal modes for liquid level ratios in the range of 30–45 percent, which are well below normal oil cargo levels and well below levels resulting from the application of HBL in this assessment. Another important consideration in developing the analytical tank vessel models was to ensure that they were, in general, reasonable representations of tank vessels serving the U.S. An analysis was conducted to determine the representativeness of the model tank vessels with respect to the existing fleet. The 70,000 dwt and 264,000 dwt pre-MARPOL, MARPOL 73 and MARPOL 78 models, and the 40,000 dwt pre-MARPOL model were compared to data on existing tank vessels obtained from ''The Tanker Register,'' Clarkson Research Studies, 1994. Information on the number of center and wing tanks, and on the cargo and ballast capacity, for existing vessels was analyzed. This analysis confirmed that the key vessel characteristics associated with the model vessels were within the distributions found on existing tank vessels.

The four deadweight categories (two tankship categories and two tank barge categories) selected for this screening represent a significant portion of tank vessels that are affected by section 4115(b) of OPA 90. Due to the nature of the measures and baseline tank vessels examined, certain of the baseline vessel and pollution prevention combinations were not analyzed because the tank vessel model already substantially meets the specification of the measure. For example, the MARPOL 78 baseline model tank vessel already substantially meets (and exceeds) PL/Space specifications. Additionally, because analyses of the pre-MARPOL baseline tank vessels and tank barges indicated that they generally operate at close to an HBL condition, the MARPOL 73 tank vessel models were selected to analyze the benefits of the measures employing HBL.

The measures researched in this screening have the following parameters:

Measure 1.a. reflects a measure that includes PL/Spaces covering 30 percent of the projected area of the sides or the projected area of the bottom of the vessels. For this measure, additional bulkheads were assumed to be installed to provide the minimum width of the PL/Spaces.

Measure 1.b. reflects a measure for PL/Spaces covering 30 percent of the projected area of the sides or the projected area of the bottom of the vessels; however, the vessels were also required to include water ballast in the wing tanks selected as PL/Spaces to provide the maximum feasible draft in the load condition. It was assumed additional ballast piping and pumping capability would be required.

Measure 1.c. reflects a measure for PL/CBT or PL/Spaces covering 30 percent of the projected area of the sides or the projected area of the bottom of the vessels; however, the vessels were also configured to carry ballast to the maximum extent possible in lieu of other spaces, with no new pumps or piping being refit. Exiting cargo wing tanks were assumed to remain as empty as possible with trim and longitudinal bending moment considerations.

Measure 2.a. reflects a measure for HBL which is incorporated in all cargo tanks.

Measure 2.b. reflects a measure for HBL which is incorporated only to the extent necessary for compliance with Regulation 13G of Annex I of MARPOL 73/78.

Measure 3 reflects a measure for a combination of HBL and PL/Spaces covering 30 percent of the projected area of the sides or the projected area of the bottom of the vessels; however, they were also configured to carry ballast to the maximum extent possible in lieu of other spaces, with no new pumps or piping being refit.

Measure 4 reflects a measure to refit a double bottom that has the minimum required depth of B/15 or 2 meters (6.56 feet) installed to cover the full length of the cargo tanks.

Measure 5 reflects a measure to refit double sides that have a minimum width of 2 meters to cover the full length of the cargo tanks.

Measure 6 reflects a measure to fit PL/Spaces covering 30 percent of the projected area of the sides or the projected area of the bottom of the vessels on tank barges. For this measure, additional bulkheads were assumed to be installed to provide the minimum width of the PL/Spaces.

Measure 7 reflects a measure to have PL/Spaces covering 30 percent of the projected of the projected area of the sides or the projected area of the bottom of the tank barge; however, the barges were also configured to carry ballast to the maximum extent possible in lieu of other spaces, with no new pumps or piping being refit. Existing cargo wing tanks were assumed to remain as empty as possible with trim and longitudinal bending moment considerations.

2. Costs

Table 2 summarizes the estimates of the cargo shutout, the onetime refit ROM costs, and the operating and voyage costs as a result of implementing the measure on the tank vessel models. Cargo shutout was calculated as the difference between the cargo capacity (98 percent) of the unmodified vessel and the cargo capacity after the measure was applied. It is expressed in both the volumetric difference and as a percentage of the cargo capacity of the baseline model.

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Table 2
Screening Analysis – Summary of Costs

Baseline Tanker Model	MEASURE	New Total Cargo Oil (Bbls) (cu.m.)	Cargo Oil Shut-Out (Bbls) (cu.m.)	Cargo Oil Shut-Out % initial	One-time refit (ROM) Costs (M$)	Opportunity Costs Per Year International	Opportunity Costs Per Year U.S. Coastal
70,000 dwt Pre-MARPOL	1.a. PL/Spaces, 30% coverage	523,444 83,221	7,072 1,124	1.3%	1.9	$6,402,000	$9,918,000
70,000 DWT Pre-MARPOL	1.b. PL/SBT, 30% coverage, with ballast to max. feasible draft	470,283 74,769	60,233 9,576	11.4%	0.5	$6,402,000	$9,918,000
70,000 dwt Pre-MARPOL	1.c. PL/CBT, 30% coverage, empty to extent feasible	470,283 74,769	60,233 9,576	11.4%	0.2	$6,402,000	$9,918,000
70,000 dwt MARPOL 73	2.a. HBL all tanks	389,854 61,982	153,655 24,429	28.3%	0	$6,402,000	$9,918,000
70,000 dwt MARPOL 73	2.b. HBL, equivalent to Regulation 13G	477,892 75,979	65,617 10,432	12.1%	0	$6,402,000	$9,918,000
70,000 dwt Pre-MARPOL	3. PL/Spaces as in 1.c. and HBL as in 2.b.	443,948 70,582	86,567 13,763	16.3%	0.2	$6,402,000	$9,918,000
70,000 dwt MARPOL 73	4. Retrofit double bottom	484,209 76,983	59,300 9,428	10.9%	9.7	$6,402,000	$9,918,000
70,000 dwt MARPOL 73	5. Retrofit double sides	502,573 79,903	502,573 79,903	7.5%	13.6	$6,402,000	$9,918,000
12,700 dwt Tank Barge	6. PL/Spaces (install bulkheads)	237,072 37,691	12,844 2,042	5.1%	2.8	*	*
12,700 dwt Tank Barge	7. PL/Spaces using existing cargo tanks	207,712 33,204	42,203 6,710	16.9%	0.3	*	*
264,000 dwt Pre-MARPOL	1.a. PL/Spaces, 30% coverage	2,031,370 322,962	46,597 7,408	2.2%	12.4	$11,279,000	$12,143,000
264,000 dwt Pre-MARPOL	1.b. PL/SBT, 30% coverage, with ballast to max. feasible draft	1,657,648 263,545	420,319 66,825	20.2%	1.8	$11,279,000	$12,143,000
264,000 dwt Pre-MARPOL	1.c. PL/CBT, 30% coverage, empty to extent feasible	1,657,648 263,545	932,159 148,201	20.2%	0.4	$11,279,000	$12,143,000
264,000 dwt MARPOL 73	2.a. HBL all tanks	1,134,047 180,299	570,481 90,699	45.1%	0	$11,279,000	$12,143,000
264,000 dwt MARPOL 73	2.b. HBL, equivalent to Regulation 13G	1,495,725 237,801	652,153 103,684	27.6%	0	$11,279,000	$12,143,000
264,000 dwt Pre-MARPOL	3. PL/Spaces as in 1.c. and HBL as in 2.b.	1,425,814 306,715	148,786 23,655	31.4%	0.4	$11,279,000	$12,143,000
264,000 dwt Pre-MARPOL	4. Retrofit double bottom	1,929,181 306,715	148,786 23,655	7.2%	26.6	$11,279,000	$12,143,000
264,000 dwt Pre-MARPOL	5. Retrofit double sides	1,921,087 305,428	156,880 24,942	7.5%	39.9	$11,279,000	$12,143,000
31,000 dwt Tank Barge	6. PL/Spaces (install bulkheads)	97,015 15,424	6,483 1,031	6.3%	1.4	*	*
31,000 dwt Tank Barge	7. PL/Spaces using existing cargo tanks	68,281 10,856	35,217 5,599	34%	0.2	*	*

*Opportunity costs were not calculated for tank barges. However, if the opportunity costs for tank vessels were extrapolated to apply to tank barges and required shipyard time is accounted for, tank barge opportunity costs would range from $2,506,000 to $5,859,000.

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3. Benefits

Benefits were developed by estimating the total annual expected accidental and operational oil outflow avoided as a result of each measure. The estimate the annual reduction in the number of barrels spilled as a result of the measures, the total annual accidental and operational oil outflow was estimated both before and after the measure was implemented. The accidental oil outflow estimates for grounding and collisions were annualized using historical spill data provided in the regulatory assessment for the NPRM and verified through an independent calculation using worldwide casualty data. Lloyd's Maritime Information Services Casualty Information System was analyzed for a sample of tank vessels drawn from Clarkson's Tanker Register to estimate the per-vessel annual probability of having grounding and collisions. The analysis resulted in annual grounding and collision probabilities of 0.026 and 0.017, respectively, for an existing tank vessel moving oil through U.S. waters in 1990.

The accidental oil outflow estimates are also presented using both Regulation 13F and 13G calculations. The Regulation 13F calculations are based on a probabilistic methodology, described in ''Interim Guidelines for the Approval of Alternative Methods of Design and Construction of Oil Tankers Under Regulation 13F(5) of Annex I of MARPOL 73/78'' (IMO Marine Environmental Protection Committee's Resolution MEPC 37/14; December 23, 1994), which uses currently available accident damage statistics for tank vessels. To obtain the total accidental oil outflow, the average bottom outflow estimate was combined with the average collision outflow estimate by using a weight of 0.6 for grounding damage and a weight of 0.4 for collision damage. The Regulation 13G calculations are more deterministic, as described in MEPC Resolution 64(36) entitled, ''Guidelines for Approval of Alternative Structural or Operational Arrangements as Called for in Regulation 13G(7) of Annex I of MARPOL 73/78.'' Both calculations take into account hydrostatic pressure from the cargo oil and the outside sea water in the case of bottom damage. They also allow for 50 percent capture by double bottom tanks in cases where bottom damage extends through these tanks. To estimate the reduction in the expected annual oil outflow as a result of the measures, the annual oil outflow for the vessel after the measure was implemented was subtracted from the total oil outflow of the baseline tank vessel. Table 3 summarizes the estimated oil outflows after implementation of each measure.

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Table 3
Screening Analysis - Summary of Estimated Oil Outflows

Baseline Tanker Model	Measure	13F Total Mean Oil (Bbls) (cu.m.)	Reg. 13G Total Oil (Bbls) (cu.m.)	% Outflow of Total Oil Carried 13F	% Outflow of Total Oil Carried 13G	Annual Mean Accidental Oil Outflow	Annual Operational Oil Outflow	Total Annual Oil Outflow
70,000 dwt Pre-MARPOL	1.a. PL/Spaces, 30% coverage	24,742 3,934	17,804 2,831	4.7%	3.4%	1,064 169	953 151	2,017 321
70,000 dwt Pre-MARPOL	1.b. PL/SBT, 30% coverage, with ballast to max. feasible draft	18,130 2,882	14,497 2,305	3.9%	3.1%	 780 124	0 0	780 124
70,000 dwt Pre-MARPOL	1.c. PL/CBT, 30% coverage, empty to extent feasible	23,022 3,660	18,181 2,891	4.9%	3.9%	990 157	0 0	990 157
70,000 dwt MARPOL '73	2.a. HBL all tanks	15,191 2,415	9,726 1,546	3.9%	2.5%	653 104	0 0	653 104
70,000 dwt MARPOL '73	2.b. HBL, equivalent to Regulation 13G	18,907 3,006	15,408 2,450	4.0%	3.2%	813 129	0 0	813 129
70,000 dwt Pre-MARPOL	3. PL/Spaces as in 1.c. and HBL as in 2.b.	15,037 2,391	12,645 2,010	3.4%	2.8%	647 103	808 128	1,455 321
70,000 dwt MARPOL '73	4. Retrofit double bottom	13,010 2,068	10,806 1,718	2.7%	2.2%	559 89	0 0	559 89
70,000 dwt MARPOL '73	5. Retrofit double sides	26,519 4,216	20,056 3,189	5.3%	4.0%	1,140 181	0 0	1,140 181
12,700 dwt Tank Barge	6. PL/Spaces (install bulkheads)	8,195 1,303	5,835 928	3.5%	2.5%	337* 53*	0 0	337* 53*
12,700 dwt Tank Barge	7. PL/Spaces using existing cargo tanks	9,989 1588	6,649 1,057	4.8%	3.2%	399* 63*	0 0	399* 63*
264,000 dwt Pre-MARPOL	1.a. PL/Spaces, 30% coverage	60,868 9,677	61,072 9,710	3.0%	3.0%	2,617 416	677 108	3,294 524
264,000 dwt Pre-MARPOL	1.b. PL/SBT, 30% coverage, with ballast to max. feasible draft	45,659 7,259	39,933 6,349	2.8%	2.4%	1963 312	0 0 0	1,963 312
264,000 dwt Pre-MARPOL	1.c. PL/CBT, 30% coverage, empty to extent feasible	81,422 12,948	66,510 10,574	4.9%	4.0%	3,502 557	0 0	3,502 557
264,000 dwt MARPOL '73	2.a. HBL all tanks	36,196 5,755	28,243 4,490	3.2%	2.5%	1,556 247	0 0	1,556 247
264,000 dwt MARPOL '73	2.b. HBL, equivalent to Regulation 13G	45,260 7,196	42,696 6,788	3.0%	2.9%	1,946 309	0 0	1,946 309
264,000 dwt Pre-MARPOL	3. PL/Spaces as in 1.c. and HBL as in 2.b.	47,976 7,628	44,508 7,076	3.4%	3.1%	2,063 328	475 76	2,538 404
264,000 dwt Pre-MARPOL	4. Retrofit double bottom	50,005 7,950	49,443 7,861	2.6%	2.6%	2,150 342	643 102	2,793 444
264,000 dwt Pre-MARPOL	5. Retrofit double sides	52,938 8,416	57,655 9,166	2.8%	3.0%	2,276 362	640 102	2,917 464
31,000 dwt Tank Barge	6. PL/Spaces (install bulkheads)	5,669 901	4,358 693	5.8%	4.5%	241* 38*	0 0	241* 38*
31,000 dwt Tank Barge	7. PL/Spaces using existing cargo tanks	6,606 1,050	5,038 801	9.7%	7.4%	279* 44*	0 0	279* 44*

*Annual mean accidental oil outflow calculations were not done for tank barges. However, if the average combined collision and grounding probabilities for tank vessels are extrapolated to apply to tank barges, this estimated oil outflow results.

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4. Cost-benefits

To estimate the cost-effectiveness ratio for each combination of tank vessel model and measure, an annualized cost of compliance calculation was divided by the annualized total expected oil outflow avoided. Because operating and voyage costs differ significantly depending on whether the tank vessel is deployed in the international or U.S. coastal fleet, cost-effectiveness ratios were developed separately for the tank vessel models by these fleet categories. These ratios were also developed assuming the tank vessels have another 5 years of remaining service life; however, the ranking of the results of the analysis do not change if a longer remaining service life is assumed. Table 4 summarizes the cost-effectiveness ratios attained in this screening analysis.

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Table 4
Screening Analysis - Summary of Benefits

Baseline Vessel Model Analyzed	Measure	Annualized Cost ($)	Outflows after Measure ACC (Bbls)	Outflows after Measure OPER Annual (Bbls)	Outflows after Measure Total (Bbls)	Baseline Outflows ACC (Bbls)	Baseline Outflows OPER Annual (Bbls)	Baseline Outflows Total (Bbls)	Reduction Increment Outfows Total (Bbls)	Cost Effectiveness ACC ($/Bbl)	Cost Effectiveness OPER Annual ($/Bbl)	Cost Effectiveness Total ($/Bbl)
International Fleet												
70,000 dwt Pre-MARPOL	1.a. PL/Spaces, 30% coverage	$507,186	1,064	953	2,017	1,149	985	2,134	118	$5,967	$15,569	$4,314
70,000 dwt Pre-MARPOL	1.b. PL/SBT, 30% coverage, with ballast to max. feasible draft	$850,643	780	0	780	1,149	985	2,134	1,354	$2,305	$863	$628
70,000 dwt Pre-MARPOL	1.c. PL/CBT, 30% coverage, empty to extent feasible	$777,694	990	0	990	1,149	985	2,134	1,144	$4,891	$789	$680
70,000 dwt MARPOL '73	2.a. HBL all tanks	$1,811,766	653	0	653	1,285	0	1,285	632	$2,867	N	$2,867
70,000 dwt MARPOL '73	2.b. HBL, equivalent to Regulation 13G	$774,642	813	0	813	1,285	0	1,284	472	$1,641	N	$1,641
70,000 dwt Pre-MARPOL	3. PL/Spaces as in 1.c. and HBL as in 2.b.	$1,091,392	647	0	647	1,149	985	2,134	1,487	$2,174	$1,108	$734
70,000 dwt MARPOL '73	4. Retrofit double bottom	$2,899,672	559	0	559	1,285	0	1,285	726	$3,994	N	$3,994
70,000 dwt MARPOL '73	5. Retrofit double sides	$3,589,187	1,140	0	1,140	1,285	0	1,285	145	$24,753	N	$24,753
264,000 dwt Pre-MARPOL	1.a. PL/Spaces, 30% coverage	$3,076,814	2,617	677	3,294	2,884	707	3,591	297	$11,524	$103,708	$10,371
264,000 dwt Pre-MARPOL	1.b. PL/SBT, 30% coverage, with ballast to max. feasible draft	$2,688,641	1,963	0	1,963	2,884	707	3,591	1,628	$2,919	$3,804	$1,652
264,000 dwt Pre-MARPOL	1.c. PL/CBT, 30% coverage, empty to extent feasible	$2,376,370	3,502	0	3,502	2,884	707	3,591	89	-3,845	$3,362	$26,763
264,000 dwt MARPOL '73	2.a. HBL all tanks	$5,086,829	1,556	0	1,556	3,803	0	3,803	2,247	$2,264	N	$2,264
264,000 dwt MARPOL '73	2.b. HBL, equivalent to Regulation 13G	$3,113,004	1,946	0	1,946	3,803	0	3,803	1,857	$1,676	N	$1,676
264,000 dwt Pre-MARPOL	3. PL/Spaces as in 1.c. and HBL as in 2.b.	$3,639,618	2,063	0	2,063	2,884	707	3,591	1,528	$4,433	$5,149	$2,382
264,000 dwt Pre-MARPOL	4. Retrofit double bottom	$6,872,886	2,150	643	2,793	2,884	707	3,591	798	$9,364	$107,842	$8,616
264,000 dwt Pre-MARPOL	5. Retrofit double sides	$9,935,982	2,276	640	2,916	2,884	707	3,591	674	$16,342	$149,573	$14,732

Table 4 (continued)
Screening Analysis - Summary of Benefits

Baseline Vessel Model Analyzed	Measure	Annualized Cost	Outflows after Measure			Baseline Outflows			Reduction Increment Outfows Total	Cost Effectiveness		
		($)	ACC (Bbls)	OPER Annual (Bbls)	Total (Bbls)	ACC (Bbls)	OPER Annual (Bbls)	Total (Bbls)	(Bbls)	ACC ($/Bbl)	OPER Annual ($/Bbl)	Total ($/Bbl)
U.S. Coastal Fleet												
70,000 dwt Pre-MARPOL	1.a. PL/Spaces, 30% coverage	$552,894	1,064	0	1,064	1,149	0	1,149	85	$6,505	N	$6,505
70,000 dwt Pre-MARPOL	1.b. PL/SBT, 30% coverage, with ballast to max. feasible draft	$1,251,458	780	0	780	1,149	0	1,149	369	$3,391	N	$3,391
70,000 dwt Pre-MARPOL	1.c. PL/CBT, 30% coverage, empty to extent feasible	$1,178,518	990	0	990	1,149	0	1,149	159	$7,412	N	$7,412
70,000 dwt MARPOL '73	2.a. HBL all tanks	$2,806,794	653	0	653	1,285	0	1,285	632	$4,441	N	$4,441
70,000 dwt MARPOL '73	2.b. HBL, equivalent to Regulation 13G	$1,200,078	813	0	813	1,285	0	1,285	472	$2,543	N	$2,543
70,000 dwt Pre-MARPOL	3. PL/Spaces as in 1.c. and HBL as in 2.b.	$1,664,500	647	0	647	1,149	0	1,149	502	$3,316	N	$3,316
70,000 dwt MARPOL '73	4. Retrofit double bottom	$3,282,916	559	0	559	1,285	0	1,285	726	$4,522	N	$4,522
70,000 dwt MARPOL '73	5. Retrofit double sides	$3,852,887	1,140	0	1,140	1,285	0	1,285	145	$26,572	N	$26,572
264,000 dwt Pre-MARPOL	1.a. PL/Spaces, 30% coverage	$3,095,882	2,617	0	2,617	2,884	0	2,884	297	$11,595	N	$11,595
264,000 dwt Pre-MARPOL	1.b. PL/SBT, 30% coverage, with ballast to max. feasible draft	$2,863,169	1,963	0	1,963	2,884	0	2,884	921	$3,109	N	$3,109
264,000 dwt Pre-MARPOL	1.c. PL/CBT, 30% coverage, empty to extent feasible	$2,550,898	3,502	0	3,502	2,884	0	2,884	-618	-4,128	N	-4,128
264,000 dwt MARPOL '73	2.a. HBL all tanks	$5,476,493	1,556	0	1,556	3,803	0	3,803	2247	$2,437	N	$2,437
264,000 dwt MARPOL '73	2.b. HBL, equivalent to regulation 13G	$3,351,468	1,946	0	1,946	3,803	0	3,803	1,857	$1,805	N	$1,805
264,000 dwt Pre-MARPOL	3. PL/Spaces as in 1.c. and HBL as in 2.b.	$3,910,914	2,063	0	2,063	2,884	0	2,884	821	$4,764	N	$4,764
264,000 dwt Pre-MARPOL	4. Retrofit double bottom	$6,935,094	2,150	0	2,150	2,884	0	2,884	734	$9,448	N	$9,448
264,000 dwt Pre-MARPOL	5. Retrofit double sides	$10,000,782	2,276	0	2,276	2,884	0	2,884	608	$16,449	N	$16,449

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Detailed Analysis

1. General.

The results from the screening analysis cost-effectiveness phase indicated that for tank vessels in both the international and U.S. coastal fleets, the appropriate measures to analyze in depth included: (1) pre-MARPOL vessels with a combination of PL/CBT and HBL (measure 3), and (2) for both MARPOL 73 vessels and MARPOL 78 vessels, an HBL measure on certain tanks (measure 2.b.). Although MARPOL 78 model tank vessels were not analyzed in the screening analysis, these vessels are similar to MARPOL 73 vessels in terms of oil outflow and related characteristics.

The screening analysis measure 3, pre-MARPOL vessels with a combination of PL/CBT and HBL, was chosen over measures 1.b and 1.c because of its overall cost-effectiveness and accidental oil outflow mitigation characteristics. In general, implementation of measure 1.c. results in higher oil outflow when bottom damage occurs. The cost effectiveness of measure 1.b and measure 3 may be considered to be roughly equivalent, however, the accidental oil outflow cost effectiveness for pre-MARPOL 264,000 dwt tankers in 34 percent greater for both international and U.S. coastal tank vessels.

To analyze the measures further, four steps were taken. First, the affected vessel population was determined and categorized by the three vessel categories. Second, a cost analysis was conducted including per vessel and total cost estimates. Then a benefit estimate was developed based on an expanded range of analytical tank vessel models developed with the same assumptions and criteria used for the screening analysis. Finally, a cost-benefit analysis was developed along with an effectiveness analysis.

Data on the world tanker fleet was obtained from several sources, including Lloyd's Maritime Information Services, Clarkson Research Studies Limited, Coast Guard Marine Safety Management System, and industry. Vessels that are expected to comply with this rulemaking were identified based on whether the vessel had complied with current financial responsibility regulations as implemented under OPA 90 and the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended. All oil tankers in the world fleet that complied with the Coast Guard's financial responsibility final rulemaking (59 FR 34210) requirements to obtain a Certificate of Financial Responsibility (COFR) as of April 30, 1995, were used as a baseline tank vessel population for this assessment. A check of the COFR database was completed to update the tank vessel numbers and make them reflect COFRs issued as of August 30, 1995. An alternative approach was also developed to assess the accuracy of using COFRs to define the baseline fleet. Port call data from 1991 to 1993 was obtained for U.S. ports, including the Louisiana Offshore Oil Port (LOOP). This data was matched with the worldwide tanker database to estimate the number of annual port calls to and from the U.S. for tank vessels in the international fleet.

Once the affected fleet was identified, vessels were categorized into one of the three vessel categories: pre-MARPOL, MARPOL 73, and MARPOL 78. Because the measures vary depending on vessel category, total fleet compliance costs and the number of barrels of spilled oil avoided as a result of the measure vary significantly depending on the distribution of the existing tank vessel fleet by vessel category. This categorization was based primarily on the vessel's delivery date, deadweight tonnage, and type (product or crude carrier). Vessels permitted to engage in U.S. coastal trade are commonly referred to as Jones Act vessels and are required to be built and flagged in the United States. These vessels must, in general, be serviced and repaired in the United States, and were designated to be in the U.S. coastal trade. Because not all U.S. flag vessels qualify as Jones Act tankers, U.S. flag tankers that operate on routes to international ports were included in the international fleet. Analysis of port call data confirmed that these vessels are engaged in international trade.

2. Costs

The incremental costs for existing single hull tank vessels to comply with the proposed measures were estimated for eight international tank vessel models and six U.S. coast tank vessel models, and for three vessel categories: pre-MARPOL. MARPOL 73, and MARPOL 78. To estimate total costs, the baseline fleet of existing single hull tank vessels was projected from 1996 to 2015 based on the double hull rulemaking phaseout schedule. Once the regulated baseline fleet are defined and projected from 1996 to 2015, total costs were estimated by multiplying the number of vessels projected to be in operation in a given year by the appropriate per-vessel compliance cost estimates. Table 5 summarizes the estimated fleet categorization and the phaseout of tank vessels affected by this rulemaking.

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Table 5
Projection of the Existing Single Hull Tank Vessel Fleet

YEAR	International			U.S. Coastal		
	Pre-MARPOL	MARPOL '73	MARPOL '78	Pre-MARPOL	MARPOL '73	MARPOL '78
1995	407	63	435	42	34	11
1996	253	50	424	6	8	11
1997	253	50	424	6	8	11
1998	253	50	424	6	8	11
1999	253	50	424	6	8	11
2000	253	50	424	6	8	11
2001	253	50	424	6	8	11
2002	235	41	424	6	8	8
2003	216	33	406	5	8	7
2004	188	28	380	5	8	7
2005	118	16	370	3	6	7
2006	81	4	351	1	1	7
2007	55	0	322	0	0	7
2008	46	0	280	0	0	4
2009	44	0	241	0	0	1
2010	26	0	217	0	0	0
2011	18	0	179	0	0	0
2012	15	0	140	0	0	0
2013	11	0	100	0	0	0
2014	7	0	74	0	0	0
2015	0	0	0	0	0	0

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General assumptions for this phase of the regulatory assessment included: (1) a vessel owner or operator will begin to comply with this rulemaking starting in 1999 and the entire fleet of tank vessels will be in compliance with the proposed measures by 2002; (2) one-third of the fleet would be in compliance with the rulemaking each year between 1999 and 2001 until the entire fleet is in full compliance by the beginning of 2002; (3) pre-MARPOL tank vessels would require physical modifications to implement PL/CBT and the number of days the tank vessel would be laid up was estimated by deadweight tonnage; (4) MARPOL 73 and 78 vessels would have no disruption in service since HBL would not require steel work or other physical modifications; (5) all tank vessels were assumed to be in full compliance with all applicable existing U.S. laws; and (6) prior compliance with HBL on MARPOL 73 or MARPOL 78 vessels was assumed to be zero.

The incremental compliance costs as a result of the measures were estimated by deadweight and vessel category for the international and U.S. coastal fleets. The categories for compliance costs were estimated as: (1) cost of operating or voyage inefficiency due to cargo shutout as a result of implementing the proposed measures; (2) cost to retrofit the existing tank vessel; and (3) cost associated with the time the vessel is expected to be out of service (i.e., opportunity costs) while the vessel is being retrofitted with the measure.

For each modeled tank vessel (pre-MARPOL, MARPOL 73, and MARPOL 78), the percentage of cargo shutout was estimated by dividing the change in cargo capacity before and after the proposed measure was implemented by the cargo capacity of the baseline vessel. Although the cargo shutout percentage varies depending on the characteristics of the tank vessel, an averaged effectiveness ratio was used for the several tank vessels that were modeled. Table 6 summarizes the cargo shutout estimates for the affected vessels.

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Table 6

Annual Per Vessel Cargo Shut-Out Cost by Vessel Category and DWT Range

DWT Ranges (DWT x 1,000)		Cargo Shut-Out			U.S. Voyages Annually			Voyage Cost (thousands $)			Cargo Shut-Out Cost (thousands $)		
		Pre-MARPOL	MARPOL '73	MARPOL '78	Pre-MARPOL	MARPOL '73	MARPOL '78	Pre-MARPOL	MARPOL '73	MARPOL '78	Pre-MARPOL	MARPOL '73	MARPOL '78
International Fleet	5-29	19%	9%	8%	7.0	6.0	9.0	1,800	1,540	2,310	350	145	192
	30-49	19%	9%	8%	7.0	7.0	7.0	2,590	2,590	2,590	503	244	215
	50-64	19%	9%	8%	10.5	15.0	10.0	3,020	4,320	2,880	588	407	239
	65-89	19%	9%	8%	10.0	11.0	28.0	2,270	2,500	6,360	442	236	529
	90-144	19%	9%	8%	7.0	6.0	9.0	4,440	3,800	5,700	863	359	475
	145-199	19%	9%	8%	9.0	9.0	9.0	10,600	10,600	10,600	2,063	1,000	882
	200-299	19%	9%	8%	2.0	2.0	2.0	4,440	4,440	4,440	865	419	370
	300+	19%	9%	8%	1.5	2.0	2.0	3,860	5,150	5,150	752	486	428
U.S. Coastal Fleet	5-29	19%	9%	8%	45.9	45.9	45.9	5,545	5,291	5,290	1,079	499	440
	30-49	19%	9%	8%	37.6	37.6	37.6	7,589	7,023	7,022	1,477	663	584
	50-64	19%	9%	8%	33.0	33.0	33.0	9,014	8,152	8,152	1,754	769	678
	65-89	19%	9%	8%	28.0	28.0	28.0	9,959	8,736	8,736	1,938	824	727
	90-199	19%	9%	8%	23.8	23.8	23.8	11,159	9,690	9,690	2,171	914	806
	200+	19%	9%	8%	10.5	10.5	10.5	12,100	11,396	11,396	2,354	1,075	948

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Retrofit cost estimates were developed by vessel category to conform to the structure of the proposed measures. The measure researched for pre-MARPOL tankers required implementation of PL/CBT using existing cargo wing tanks. These vessels would incur costs associated with converting the cargo tanks to ballast tanks and modifying the cargo piping and related systems. Cost differences were included in this analysis for the disparity between foreign and U.S. shipyards. MARPOL 73 and MARPOL 78 vessels, however, would not incur a onetime cost because the measure researched for these vessels required implementation of HBL. A structural analysis of the analytical tank vessel models determined that, in general, HBL could be implemented on these vessels without having to reinforce bulkheads and related structures.

Opportunity costs were estimated to account for the onetime cost tank vessels would be out of service as a result of being retrofitted. This cost was estimated by subtracting from the daily time charter rate the daily operating cost that would be saved as a result of being out of service as well as crew cost savings if the retrofit would take more than two weeks since crews would be flown home. For pre-MARPOL vessels, the number of days the tank vessel would be laid up was estimated by deadweight ton range. A summary of the onetime costs and opportunity costs for the measures is presented in Table 7. For MARPOL 73 and MARPOL 78 vessels, no disruption in service was assumed. Therefore, no opportunity costs were considered.

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Table 7
Summary of Onetime and Opportunity Costs

Pre-MARPOL Vessels DWT Ranges (DWT x 1,000)		Opportunity Costs						Onetime Refit Costs (ROM)
		Timecharter Rates ($/day)	Avoided Op. Cost Exc. Crew ($/day)	Crew Costs ($/day)	Time Out of Service (days)	Lost Daily Operating Contrib. ($/day)	Total Annual Opportunity Cost	
International Fleet	5-29	13,000	2,500	2,400	6	10,600	$63,000	$328,000
	30-49	15,000	2,800	2,700	7	12,300	$84,000	$552,000
	50-64	17,000	3,530	3,000	7	13,600	$93,000	$702,000
	65-89	19,000	3,910	3,570	7	15,200	$104,000	$803,000
	90-144	19,000	4,700	3,600	7	14,400	$99,000	$988,000
	145-199	19,000	5,490	4,000	8	13,600	$107,000	$1,183,000
	200-299	23,000	6,890	4,700	8	16,000	$125,000	$1,474,000
	300+	32,000	8,280	5,000	8	23,600	$185,000	$1,792,000
U.S. Coastal Fleet	5-29	25,000	3,650	5,600	6	21,400	$128,000	$340,000
	30-49	30,000	5,250	6,600	7	24,700	$170,000	$600,000
	50-64	35,000	6,050	7,200	7	28,900	$199,000	$780,000
	65-89	40,000	6,320	7,200	7	33,700	$231,000	$930,000
	90-199	50,000	6,450	8,000	7	43,600	$299,000	$1,330,000
	200+	62,000	7,930	7,100	8	54,100	$424,000	$1,710,000

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The affected fleet was also analyzed to determine whether a vessel owner or operator would replace the vessel with a double hull vessel rather than implement the measures researched in this regulatory assessment. The key consideration underlying the decision about whether to ‘‘replace’’ or ‘‘retrofit’’ depends on whether the amortized costs to purchase and operate a double hull tank vessel are less than the annualized incremental cost for a single hull vessel to comply with the proposed measure. The existing single hull tank vessel is assumed to be replaced if the amortized cost of purchasing and operating a new double hull vessel earlier than required is less expensive than retrofitting the existing tank vessel with the proposed measure. This analysis dependent on several factors, including the onetime retrofit costs of the measures; the annual costs related to cargo shutout; the number of years remaining until the existing single hull vessel must be replaced by a double hull vessel; the price the vessel owner would receive if the single hull vessel was replaced (scrap or secondhand price); and the capital costs and operating costs of a double hull vessel. The analysis indicated that none of the fleet of existing single hull vessels would be replaced early by double hull vessels due to the measures in this phase of the regulatory assessment. The primary reason for this outcome is that the compliance costs for the measures, including the onetime capital costs, are relatively low in comparison to the annualized cost to purchase and operate double hull vessels.

3. Government Costs

The majority of tank vessels owned or operated by the Federal Government, such as oil tank vessels used by the U.S. Navy, qualify as public vessels under OPA 90 and are not subject to this rulemaking. The National Defense Reserve Fleet/Ready Reserve Force (NDRF/RRF) currently does not qualify for the public vessel exemption and has ten tank vessels available for service that would be affected by this rulemaking. Because the NDRF/RRF is composed of vessels similar to those used in this analysis, costs and benefits would be similar. However, there is legislation being discussed that would exempt these vessels from the OPA 90 double hull phase-in requirements. Because these vessels may not be subject to this rulemaking and no specific regulatory language is proposed in this SNPRM, this analysis did not include costs to the NDRF/RRF.

The burden of implementing structural measures may require the Coast Guard to conduct plan review for those vessels refitting their tanks or spend time inspecting vessels for compliance; however, since specific regulatory language is not proposed in this SNPRM, no government cost is associated with it.

4. Benefits

The incremental reduction in the volume of oil spilled as a result of the measures was determined by estimating the difference in the accidental oil volume spilled and operational discharges for the baseline fleet before and after the measures were implemented on the analytical tanker models. This benefit analysis was completed in three steps. First, accidental oil spill volumes and operational discharges for the baseline fleet over time by vessel category and deadweight ton ranges were completed. Second, the effectiveness of the measures to reduce accidental spill volumes and operational discharges on the applicable portions of the baseline fleet was determined. Third, the effectiveness ratios were used to estimate the reduction in oil spill volumes as a result of each measure.

The volume of oil spilled due to accidents by the baseline fleet was estimated based on an analysis of historical oil spill data in both U.S. waters and international waters. This analysis was similar to the accident analysis done for the screening phase of this regulatory assessment. Historical data taken from the regulatory assessment done for the NPRM was adjusted using worldwide spill data to fully account for the effectiveness of the measures in reducing oil spills for the international fleet. Additionally, annual spill rates were estimated based on oil movement projections and an annualized estimate of the adjusted accidental spill data. The volume of oil moved in any year after 1995 was estimated by reducing the volume of oil moved by the baseline fleet by the proportion of existing single hull tank vessels projected to be in operation for each year between 1996 and 2015. Accidental oil spill volumes were estimated by applying the spill rates to the volume of oil moved by the baseline fleet in future years. These spill volumes were estimated by deadweight ton range and vessel category for tank vessels in the international and U.S. coastal fleets.

The benefits also included estimates on the difference in the operational discharges for the baseline fleet before and after the proposed measures would be implemented. Assumptions made for the benefits of the measures for reducing operation discharges included: (1) for the operational discharge analyses, only pre-MARPOL tank vessels have operational discharges because these vessels are not equipped with sufficient SBT or CBT capacity; (2) pre-MARPOL tank vessels in the U.S. coastal fleet were assumed to have no operational discharges because they spend the majority of their time in U.S. waters; however, the pre-MARPOL tank vessels in the international fleet were estimated to have operational discharges when outside U.S. waters; (3) for the operational discharge analyses, pre-MARPOL tank vessels were assumed to meet MARPOL 73 requirements and discharge no more than 1/15,000 of their cargo per voyage; and (4) annual operational discharge volume varies proportionately with the estimated number of U.S. voyages. Projected accidental and operational discharges for the baseline fleet with no measures implemented were estimated over the period of this rulemaking and are summarized in Table 8.

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Table 8

Accidental and Operational Oil Spill Volumes for the Baseline Fleet

VESSEL CATEGORY			TOTAL BARRELS SPILLED/DISCHARGED					
			1996	1999	2001	2005	2010	2015
U.S. Coastal	Pre-MARPOL		1,207	1,207	1,207	463	0	0
	MARPOL '73		1,418	1,418	1,418	962	0	0
	MARPOL '78		2,021	2,021	2,021	988	0	0
International	Pre-MARPOL	Accidental	7,135	7,135	7,135	2,522	439	0
		Operational	28,440	28,440	28,440	11,308	1,347	0
		Total	35,575	35,575	35,575	13,830	1,787	0
	MARPOL '73		2,550	2,550	2,550	478	0	0
	MARPOL '78		32,693	32,693	32,693	24,170	12,837	0
Total			75,464	75,464	75,464	40,891	14,624	0

Note: As indicated in Table 8, only international Pre-MARPOL tank vessel are estimated to have appreciable operational discharges. Consequently, for this vessel category, accidental oil outflow and operational discharges are shown separately. For all other vessel categories, only the accidental oil spill volume is shown.

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Effectiveness ratios were developed based on the results of the oil outflow analyses conducted on the analytical tank vessel models. In addition to developing the effectiveness ratios for the existing single hull tank vessel fleet, ratios were also developed for potential ‘‘early phase-in’’ of double hull tank vessels with comparable carriage capacity. Accidental oil spill incident effectiveness ratios were developed for three of the five incident categories: groundings, collisions, and structural failures. The measures were not expected to directly affect oil outflow in the event of fires or explosions or oil spills that occur during cargo transfer operations. Effectiveness ratios for groundings and collisions were developed based on the oil outflow estimates using the guidelines for Regulation 13F and 13G of Annex I of MARPOL 73/78. Structural failure ratios were developed based on an analysis of casualty incidents as reported in a Ship Structural Committee report entitled ‘‘A Limited Survey of Ship Structural

Damage,'' published in 1971 (NO. SSC-220). A 100 percent effectiveness ratio for operational spills, applicable to the PL/CBT and HBL measure on pre-MARPOL tank vessels, was used for this analysis because it was assumed they would use the CBTs, thereby avoiding the need to discharge dirty ballast from cargo tanks. Effectiveness ratios for each measure and a comparison between comparable deadweight ton double hull design are summarized in Table 9.

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Table 9
Percent Effectiveness Ratios for Vessels

DWT Ranges (DWT x 1,000)		Groundings: Single Hull Vessels	Groundings: Double Hull Vessels	Collisions: Single Hull Vessels	Collisions: Double Hull Vessels	Structural Failures: Single Hull Vessels	Structural Failures: Double Hull Vessels
Pre-MARPOL Vessels with PL/CBT and HBL Implemented							
International and U.S. Coastal	5-29	12%	85%	39%	70%	30%	90%
	30-49	18%	82%	39%	68%	30%	90%
	50-64	23%	79%	39%	65%	30%	90%
	65-89	20%	75%	39%	62%	30%	90%
International	90-144	25%	67%	39%	55%	30%	90%
	145-199	23%	58%	39%	49%	30%	90%
	200-299	26%	51%	39%	60%	30%	90%
	300+	25%	30%	39%	55%	30%	90%
U.S. Coastal	90-199	25%	62%	39%	51%	30%	90%
	200+	25%	52%	39%	61%	30%	90%
MARPOL '73 with HBL Implemented							
International and U.S. Coastal	5-29	38%	92%	11%	52%	3%	90%
	30-49	38%	90%	12%	49%	3%	90%
	50-64	43%	88%	14%	47%	3%	90%
	65-89	45%	86%	15%	43%	3%	90%
International	90-144	47%	82%	14%	36%	3%	90%
	145-199	50%	79%	12%	31%	3%	90%
	200-299	56%	78%	12%	51%	4%	90%
	300+	62%	72%	11%	49%	4%	90%
U.S. Coastal	90-199	49%	80%	16%	33%	3%	90%
	200+	56%	78%	11%	51%	4%	90%
MARPOL '78 with HBL Implemented							
International and U.S. Coastal	5-29	35%	92%	8%	29%	2%	90%
	30-49	38%	90%	10%	32%	3%	90%
	50-64	40%	89%	12%	31%	3%	90%
	65-89	41%	87%	12%	28%	3%	90%
International	90-144	41%	85%	11%	22%	3%	90%
	145-199	42%	82%	10%	16%	3%	90%
	200-299	43%	82%	9%	42%	3%	90%
	300+	44%	79%	9%	42%	3%	90%
U.S. Coastal	90-199	42%	83%	10%	19%	3%	90%
	200+	43%	83%	9%	42%	3%	90%

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The estimated incremental benefits of the measure in terms of the number of spilled barrels avoided was calculated by multiplying the effectiveness ratios by the accidental oil spill and operational discharge volumes estimated for the baseline fleet. As the existing single hull tank vessel fleet is phased out over time, the benefits are projected to decrease to zero at the beginning of 2015. The present value and annualized value of the number of barrels spilled that would be avoided were also estimated using a real discount rate of seven percent. Table 10 summarizes the number of spilled barrels avoided in selected years starting in 1999, by vessel category, for the international and U.S. coastal fleets. It also includes a break down of benefits by fleet categories. For this section of the table, small vessels are defined as all international and U.S. coastal tank vessels less than 30,000 dwt and large vessels are defined as all international and U.S. coastal tank vessels that are greater than or equal or 30,000 dwt. The Jones Act fleet numbers represent both small and large vessels numbers. Therefore, these three categories are not mutually exclusive.

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TABLE 10

Benefits of the Proposed Measures by Category

VESSEL CATEGORY		Total Spilled Barrels Avoided Present-Value	Total Spilled Barrels Avoided Annualized	YEAR 1999	YEAR 2001	YEAR 2005	YEAR 2010	YEAR 2015
U.S. Coastal	Pre-MARPOL	848	80	87	261	108	0	0
	MARPOL '73	1,001	95	93	278	190	0	0
	MARPOL '78	1,286	121	137	411	196	0	0
International	Pre-MARPOL	94,873	8,955	10,014	30,042	11,855	1,435	0
	MARPOL '73	1,250	118	185	555	98	0	0
	MARPOL '78	31,901	3,011	2,228	6,685	4,933	2,631	0
Total		131,159	12,380	12,744	38,232	17,380	4,066	0
Fleet Category								
Jones Act		3,135	296	317	951	494	0	0
Small Vessels		32,305	3,049	2,479	7,438	4,496	1,510	0
Large Vessels		98,853	9,331	10,265	30,794	12,884	2,556	0

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5. Cost-benefits

The estimated cost per barrel of unspilled oil is categorized by international and U.S. coastal fleets in Table 11. These cost-effectiveness estimates were developed using a 7 percent real discount rate. The table also includes a breakdown of estimated cost per barrel of unspilled oil for small vessels, large vessels and Jones Act vessels. These fleet categories are not mutually exclusive. As shown in Table 11, there is a difference in the estimated cost-benefit for pre-MARPOL international tank vessels as compared to the U.S. coastal tank vessel fleet. The primary reason for this difference is that the measure reduces both accidental and operational oil outflow for the pre-MARPOL international fleet. The retrofit costs for these vessels to implement the measures are also greater for U.S. coastal tank vessels of a given deadweight tonnage because they would be required to have the retrofit work performed at U.S. shipyards, which historically have charged higher rates than foreign shipyards.

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Table 11
Cost per Barrel of Spilled Oil Avoided by Category

VESSEL CATEGORY		Present Value Cost Per Barrel	YEAR				
			1999	2001	2005	2010	2015
U.S. Coastal	Pre-MARPOL	$35,517	$44,445	$36,119	$43,785	$0	$0
	MARPOL '73	$19,235	$18,842	$18,842	$21,496	$0	$0
	MARPOL '78	$22,999	$20,004	$20,004	$25,473	$0	$0
International	Pre-MARPOL	$4,954	$7,782	$5,068	$4,101	$6,332	$0
	MARPOL '73	$34,335	$26,963	$26,963	$50,275	$0	$0
	MARPOL '78	$25,744	$23,911	$23,911	$26,653	$30,017	$0

FLEET CATEGORY						
Jones Act	$25,186	$26,376	$24,090	$27,931	$0	$0
Small Vessels	$8,834	$13,411	$9,560	$8,055	$9,200	$0
Large Vessels	$11,408	$10,844	$9,055	$12,622	$29,014	$0

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The present value cost of the measures researched in this assessment was estimated over a 19-year time period (1996 to 2015). Using a 7 percent real discount rate, the present value cost would be $1.41 billion. The annualized value is approximately $133 million. The present and annualized value of the number of barrels of spilled oil avoided is estimated to be about 131,000 barrels and 12,300 barrels, respectively.

This SNPRM is an economically significant regulatory action under section 3(f) of Executive Order 12866 and has been reviewed by the Office of Management and Budget under that order. It requires an assessment of potential costs and benefits under section 6(a)(3) of that order. It is significant under the regulatory policies and procedures of the Department of Transportation (DOT) (44 FR 11040; February 26, 1979).

Because the Coast Guard wishes to provide the public with an opportunity to comment on the economic feasibility of this assessment, no regularity text is introduced in this SNPRM. Comments received on this SNPRM will enable the Coast Guard to further evaluate the economic feasibility for structural measures and determine whether additional regulations are appropriate to implement section 4115(b) of OPA 90.

Notice of Availability

The Coast Guard solicits comments on the regulatory assessment for this SNPRM. Copies of the regulatory assessment, entitled ''Regulatory Assessment of Supplemental Notice of Proposed Rulemaking on Structural Measures for Existing Single Hull Tankers'' are available for inspection at U.S. coast Guard Headquarters or can be ordered through the National Technical Information Service (NTIS), Springfield, Virginia, 22161 by requesting report number PB96–119086. Orders can also be placed by calling NTIS at (703) 487–4650 or (800) 553–6847.

Small Entities

Under the Regulatory Flexibility Act (5 U.S.C. 601 *et seq.*,), the Coast Guard must consider whether this proposal, if adopted, will have a significant economic impact on a substantial number of small entities. ''Small entities'' may include (1) small businesses and not-for-profit organizations that are independently owned and operated and are not dominant in their fields and (2) governmental jurisdictions with populations of less than 50,000.

This rulemaking considered small business impact for vessels privately held by independent companies with an estimated capital investment value of less than $500 million or companies with that have less than 500 employees. State and local governments, which altogether own less than a dozen tank vessels, will not be significantly affected. Not-for-profit organizations do not engage in the transportation of oil in bulk by water.

There are a number of companies meeting the definition of a small business operating tank vessels. Of the 190 U.S. tankships affected by this rulemaking, 16 are owned by 6 small businesses. Many of these company's tankships are over 30 years old, have less cargo carrying capacity than their competition, and are laid up due to market or company financial conditions. Six small businesses own or operate 32 of the affected U.S. tank barge population. No foreign small businesses own or operate foreign tank vessels that would be affected by this rulemaking.

If structural measures were imposed on the small businesses that own or operate tank vessels, an economic impact is unavoidable, as the statue clearly targets existing vessels of 5,000 GT or more that carry oil in bulk as cargo and that do not have double hulls. A complete review of this impact on small entities would be done if the Coast Guard proposes specific structural requirements.

This SNPRM responds to comments received on the NPRM, presents a summary of a regulatory assessment for various structural measures, notifies the public of the availability of this assessment, and solicits comments on the economic feasibility of the measures. This SNPRM does not propose specific regulatory text. Therefore, the Coast Guard certifies under 5 U.S.C. 605(b) that this SNPRM will not have a significant economic impact on a substantial number of small entities. If you think that your business or organization qualifies as a small entity and the NPRM cost assessment, as modified by the discussions and data provided in this document, will have a significant economic impact on your business or organization, please submit a comment (see **ADDRESSES**) explaining why you think it qualifies and in what way and to what degree this proposal will economically affect it.

Collection of Information

Under the Paperwork Reduction Act (44 U.S.C. 3501, *et seq.,*), the Office of Management and Budget (OMB) reviews each proposed rule that contains a collection-of-information requirement to determine whether the practical value of the information is worth the burden imposed by its collection. Collection-of-information requirements include reporting, recordkeeping, notification, and other similar requirements. This proposal contains no collection of information requirements.

Federalism

The Coast Guard has analyzed this proposal under the principles and criteria contained in Executive Order 12612 and has determined that this proposal does not have sufficient federalism implications to warrant the preparation of a Federalism Assessment.

Environment

The Coast Guard has considered the environmental impact of this supplemental notice of proposed rulemaking under COMDTINST M16475.1B. Although this SNPRM proposes no Federal regulations and therefore does not amount to the type of major Federal action typically subject to analysis under the National Environmental Policy Act (NEPA), the Coast Guard solicits comments on its analysis of structural measures. An Environmental Assessment (EA) from the notice of proposed rulemaking (NPRM) is available in the docket for copying and inspection as indicated in the ‘‘ADDRESSES’’ section of this preamble.

By the year 2015, all tank vessels (with certain exceptions) over 5,000 dwt operating in U.S. waters will be equipped with double hulls. In the interim, the Coast Guard has been given wide latitude under OPA 90 section 4115(b) to set structural and operational standards for single hull vessels for the purpose of reducing the amount of oil spilled into the marine environment.

Sound structural design and efficient operational procedures, when combined with other requirements of OPA 90, should contribute to increased environmental protection and human safety. The impact of section 4115(b), however is not expected to result in significant impact on the quality of human environment, as defined in the NEPA.

Although no regulatory text is introduced in this SNPRM, the public is encouraged to comment on the technological and economic feasibility of the structural measures discussed in this SNPRM. Comments received on this SNPRM will enable the Coast Guard to assess the economic and technological feasibility of structural measures to reduce the risk of oil outflow from existing tank vessels and effectively implement section 4115(b) of OPA 90.

Dated: December 21, 1995.

A.E. Henn,

Vice Admiral, U.S. Coast Guard, Acting Commandant.

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